CLAIMS

1. An immunoglobulin heavy chain comprising a bovine C_H3 domain wherein said C_H3 domain has at least one mutation selected from the group consisting of S174G, Y179D, G197K, G197A, S207G and T246L.

2. An immunoglobulin heavy chain comprising a bovine C_H2 domain wherein said C_H2 domain has at least one mutation selected from the group consisting of N85H, R109P, T116L and H126N.

3. An immunoglobulin heavy chain comprising a murine C_H2C_H3 domain wherein said C_H2C_H3 domain has at least one mutation selected from the group consisting of V48T, I64V, K66Q, S104V, S127N, F130L, F176Y, W186S, Q200P, V211L and A224Q.

4. An immunoglobulin heavy chain comprising a human C_H2C_H3 domain wherein said C_H2C_H3 domain has at least one mutation selected from the group consisting of K72Q, Y98F, L111Q, S126N and V202Q.

5. An isolated polynucleotide comprising a nucleotide sequence encoding the immunoglobulin heavy chain of any one of claims 1-4.

6. A method of increasing the stability of an IgG heavy chain, which method comprises replacing the C_H3 domain of said IgG heavy chain with a C_H3 domain as defined in claim 1.

7. A method of increasing the stability of an IgG heavy chain, which method comprises replacing the C_H2 domain of said IgG heavy chain with a C_H2 domain as defined in claim 2.

8. A method of increasing the stability of an IgG heavy chain, which method comprises replacing the C_H2C_H3 domains of said IgG heavy chain with a C_H2C_H3 domain as defined in claim 3 or claim 4.

9. An isolated polynucleotide comprising a nucleotide sequence which has at least 90% sequence identity to any one of SEQ ID NOs: 1, 3, 5, 7, 9, 11, 13 or 15, or the complement thereof.

10. An isolated polynucleotide according to claim 9, comprising any one of SEQ ID NOs: 1, 3, 5, 7, 9, 11, 13 or 15, or the complement thereof.

11. An isolated polynucleotide comprising a nucleotide sequence which has at least 90% sequence identity to any one of SEQ ID NOs: 2, 4, 6, 8, 10, 12, 14 or 16, or the complement thereof.

12. An isolated polynucleotide according to claim 11, comprising any one of SEQ ID NOs: 2, 4, 6, 8, 10, 12, 14 or 16, or the complement thereof.

13. An isolated polynucleotide comprising at least 15 nucleotides that hybridizes under stringent conditions to the isolated polynucleotide of any one of claims 9-12.

14. The isolated polynucleotide of any one of claims 9-13, wherein said polynucleotide encodes at least one variable region of an antibody or antibody fragment.

15. The isolated polynucleotide of claim 14 wherein said variable region is a heavy chain variable region.

16. The isolated polynucleotide of claim 14 wherein said variable region is a light chain variable region.

17. An isolated polypeptide comprising an amino acid sequence encoded by the polynucleotide of any one of claims 9-16.

18. A recombinant vector comprising the isolated polynucleotide of any one of claims 9-16.

19. An expression cassette comprising as operably linked components, at least one promoter, at least one isolated polynucleotide of any one of claims 9-16, and at least one termination sequence.

20. The expression cassette of claim 19, further comprising an endoplasmic reticulum retention signal.

21. The expression cassette of claim 20, wherein the endoplasmic reticulum retention signal is SEQ ID NO 35.

22. The expression cassette of any one of claims 19-21, wherein said promoter is the CMPS promoter or the ubiquitin promoter.

23. A host cell comprising the recombinant vector of claim 18, or the expression cassette of any one of claims 19-22.

24. The host cell of claim 23, wherein said host cell is selected from the group consisting of bacterial cells, fungal cells, insect cells, yeast cells, algae, plant cells and animal cells.

25. A transgenic plant comprising at least one of the polynucleotides of any one of claims 9 to 13, or any combination thereof.

26. The transgenic plant of claim 25, wherein said plant expresses an antibody or antibody fragment.

27. The transgenic plant of claim 26, wherein said antibody or antibody fragment is a single chain antibody, a scFv, or a VHH antibody.

28. The transgenic plant of claim 27, wherein said plant is selected from the group consisting of corn, wheat, rye, barley, rice, oats, soybean, and tobacco.

29. The transgenic plant of claim 26 or claim 27, wherein said antibody or antibody fragment binds a K88 or K99 antigen.

30. A transgenic plant comprising:
at least one polynucleotide according to any one of claims 9, 10, or 13-15, or a combination thereof; and
at least one polynucleotide according to any one of claims 10-14 or 16, or a combination thereof.

31. The transgenic plant of claim 30, wherein said plant is selected from the group consisting of corn, wheat, rye, barley, rice, oats, soybean, and tobacco.

32. The transgenic plant of claim 30 or claim 31, wherein said plant expresses an antibody or an antibody fragment.

33. The transgenic plant of claim 32, wherein said antibody is a scFv.

34. The transgenic plant of claim 32 or claim 33, wherein said antibody binds to a K88 or a K99 antigen.

35. The immunoglobulin heavy chain of any one of claims 1-4, further comprising a variable region encoded by the polynucleotide of claim 15.

36. The isolated polynucleotide of claim 5, further comprising the polynucleotide of claim 15.

37. The transgenic plant of claim 26, wherein said antibody or antibody fragment further comprises a bovine C_H3 domain, wherein said C_H3 domain has at least one mutation selected from the group consisting of S174G, Y179D, G197K, G197A, S207G and T246L.

38. The transgenic plant of claim 26, wherein said antibody or antibody fragment further comprises a bovine C_H2 domain wherein said C_H2 domain has at least one mutation selected from the group consisting of N85H, R109P, T116L and H126N.

39. The transgenic plant of claim 26, wherein said antibody or antibody fragment further comprises a murine C_H2C_H3 domain wherein said C_H2C_H3 domain has at least one mutation selected from the group consisting of V48T, I64V, K66Q, S104V, S127N, F130L, F176Y, W186S, Q200P, V211L and A224Q.

40. The transgenic plant of claim 26, wherein said antibody or antibody fragment further comprises a human C_H2C_H3 domain wherein said C_H2C_H3 domain has at least one mutation selected from the group consisting of K72Q, Y98F, L111Q, S126N and V202Q.

41. A transgenic plant comprising the polynucleotide of claim 5.

42. The transgenic plant of claim 41, further comprising at least one polynucleotide selected from the group consisting of SEQ ID NOs. 1-16.

43. A method of treating or preventing an enteric disease in an animal comprising enteral administration an effective amount for treating or preventing an enteric disease in an animal of a compound containing material or partially purified material from a plant of any one of claims 25-34 or 37-42.

44. The method of claim 43, wherein said material comprises leaf material, seed material, fruit material, root material, stem material or any combination thereof.

45. The method of claim 43 or 44, wherein said enteral administration comprises oral administration.

46. The method of claim 45, wherein said material comprises a liquid.

47. The method of any one of claims 43-45, wherein said material has been dried.

48. The method of any one of claims 43-47, wherein said effective amount comprises at least 10 mg of antibody per day.

49. A composition comprising a transgenic plant of any one of claims 25-34 or 37-42, or material from said transgenic plant.

50. A pharmaceutical composition comprising a transgenic plant of any one of claims 25-34 or 37-42, or material from said transgenic plant.

51. The pharmaceutical composition of claim 50, further comprising a pharmaceutically acceptable carrier, excipient or diluent.

52. The composition of claim 49, wherein said composition is comprised by an animal feed.

53. The composition of claim 49, wherein said composition is comprised by a food product.

54. The composition of claim 49, wherein said composition is comprised by an animal feed additive.

55. The composition of claim 54, wherein said feed additive is a feed pre-mix.

56. The composition of claim 49, wherein said composition comprises a nutritional supplement.

57. A composition comprising a milk replacer containing a transgenic plant of any one of claims 25-34 or 37-42, or material from said transgenic plant.

58. An isolated polynucleotide encoding a polypeptide selected from the group consisting of SEQ ID NOs 17, 18 and 67-72.

59. A method of producing an antibody or a fragment thereof, which method comprises:

i) introducing an expression cassette according to any one of claims 19 to 23 into a plant cell;

ii) expressing a polypeptide from the polynucleotide component of said expression cassette; and optionally

iii) purifying said polypeptide;

wherein said polypeptide is an antibody or a fragment thereof.

60. A method of producing an antibody or a fragment thereof, which method comprises:

i) introducing an expression cassette according to any one of claims 19 to 23 into plant cells;

ii) regenerating a whole plant from said plant cells;

iii) expressing in said whole plant a polypeptide from the polynucleotide component of said expression cassette; and optionally

iv) purifying said polypeptide;

wherein said polypeptide is an antibody or a fragment thereof.